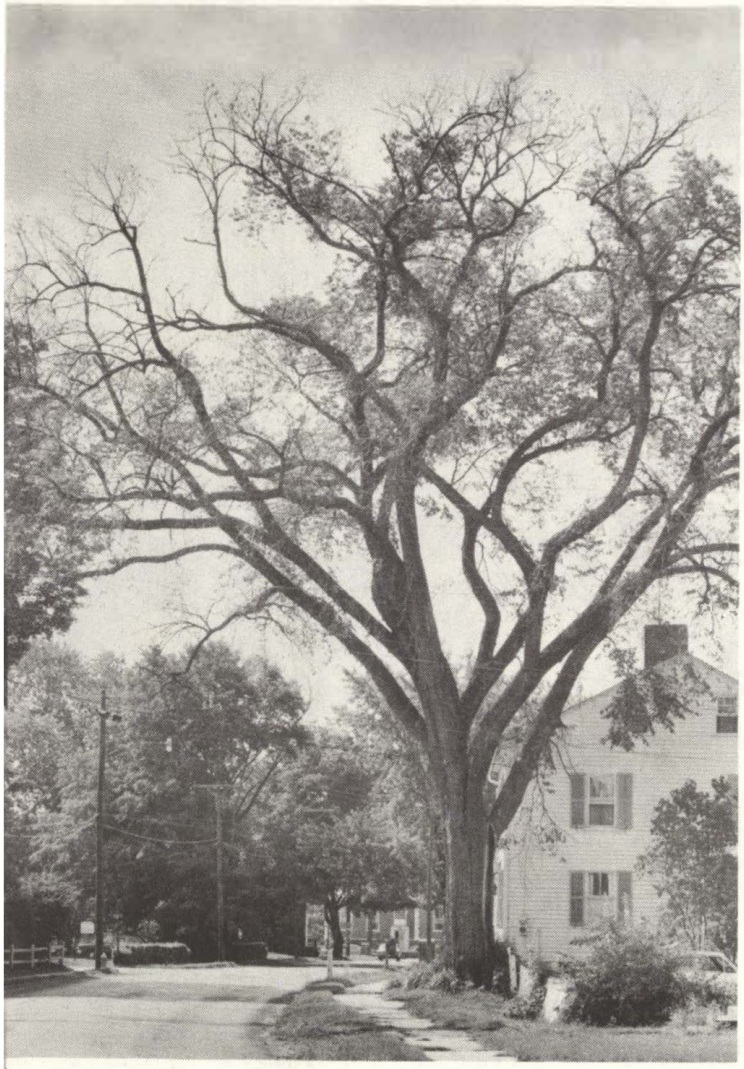
FORESTRY SCIENCE IN THE SERVICE OF MAN

Number 9

researching

Dutch Elm Disease



The American elm -- for over 300 years one of our most cherished shade trees -- is being threatened with extinction by Dutch elm disease. Introduced into this Country in the early 1930's, Dutch elm disease is now our most destructive shade tree problem. It has already killed 40 percent of our elms.

To prevent the loss of the remaining American elms vulnerable to the disease, the Forest Service conducts Dutch elm disease research in its Shade Tree Insect Work unit, at the Forest Insect and Disease Laboratory in Delaware, Ohio. Dr. Charles Lincoln heads the research unit which has total federal shade tree insect research responsibilities for the Northeastern United States, where 70 percent of our Nation's 200 million shade trees grow.

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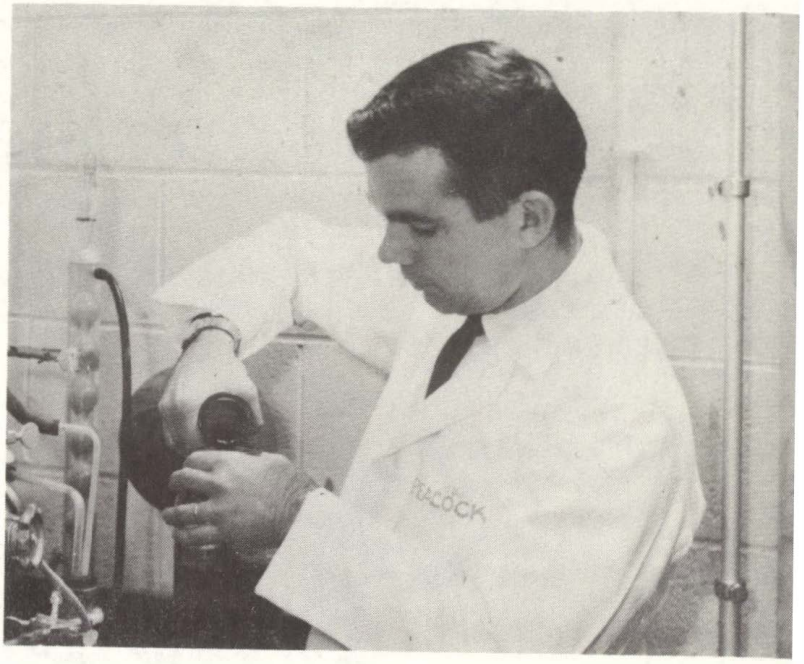
NORTHEASTERN FOREST EXPERIMENT STATION • UPPER DARBY, PENNSYLVANIA 19082



Forest Service entomologist, Dr. John W. Peacock, stationed at the Forest Insect and Disease Laboratory, Delaware, Ohio, tested the response of the Dutch elm disease carrier-insects to the elm bark and various extracts of it.

The forestry scientists are currently working at reducing the number of elm bark beetles (the disease's carrier) by tackling the problems of finding alternate or supplemental insect management control procedures based on biological principles, by seeing how the effectiveness of non-toxic chemicals and insecticides can be used in controlling the insect, and by looking into sex attractants produced by the beetles.

At present the only feasible way of combating the elm disease is through its accomplice, the elm bark beetle. For years scientists felt that the beetle fed on elm twigs because the bark contains a certain chemical. But, they were unable to isolate what it was that the beetle thought was 'tasty'.

Now, however, they believe they have the answer. Working with chemists from Ohio State University's Department of Pharmacy, they isolated and identified two compounds found in elm bark twigs which stimulate feeding by the adult elm bark beetles.

Armed with this new information, scientists may now be able to open up new approaches to the control of this insect and thus the disease which it transmits. For example, tree geneticists may now be able to measure the susceptibility of new elm varieties to beetle feeding, based on the concentration of these chemicals in twig bark. Another possibility, scientists may be able to mask the stimulatory effects of these chemicals through chemical treatment of tree bark.

In other research on elm bark beetles, forestry scientists are studying and evaluating new chemical insecticides, to determine their presistence, whether they will harm the environment, and their effectiveness in controlling the beetle. In recent studies, the

scientists tested methoxychlor, to see if it could be used to replace DDT. And the tests were successful.

This chemical was selected because it is not as persistent in the environment as DDT -- and is less toxic to birds, animals and people than DDT is. Research is being conducted with cooperators to answer several critical questions about this chemical's effectiveness and persistence.

The forestry scientists are also experimenting with insects which parasitize and kill the elm bark beetles, as a control measure. One such parasite came from France and is called Dendrosoter protuberans. It is no bigger than a gnat, but under a microscope it resembles a wasp.

This wasplike female parasite, deposits her eggs through the elm bark onto the larvae of the elm bark beetle. When the eggs hatch, the larvae feed on the beetle's larvae, killing them. However, the parasite is restricted by bark thickness and fewer of them are found in thick-bark elm tree areas than in the thinner bark areas. Bark thickness, therefore poses a restruction to the effectiveness of this parasite.

Related publications by Forest Service and cooperating researchers -

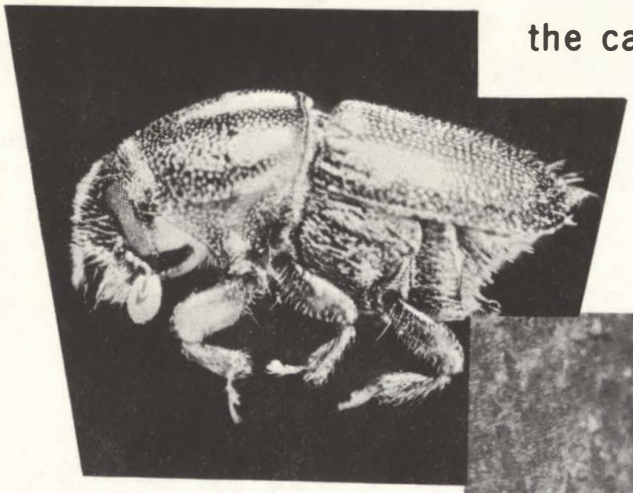
Lincoln, A. C. and L. R. Schreiber. 1972. The Dutch elm disease and its control. Agriculture Information Bulletin No. 193 (rev) U. S. Dept. of Agric.

Kennedy, B. H. 1970. Dendrosoter protuberans (Hymenoptera: Braconidae), an introduced larval parasite of Scolytus multistriatus. Ann. Entomol. Soc. Amer., 63:351-358

Peacock, J. W., A. C. Lincoln, J. B. Simeone, and R. M. Silverstein. 1971. Attraction of Scolytus multistriatus (Coleoptera: Scolytidae) to a Virgin-female-produced pheromone in the field. Ann. Entomol. Soc. Amer. 64(5): 1143-1149

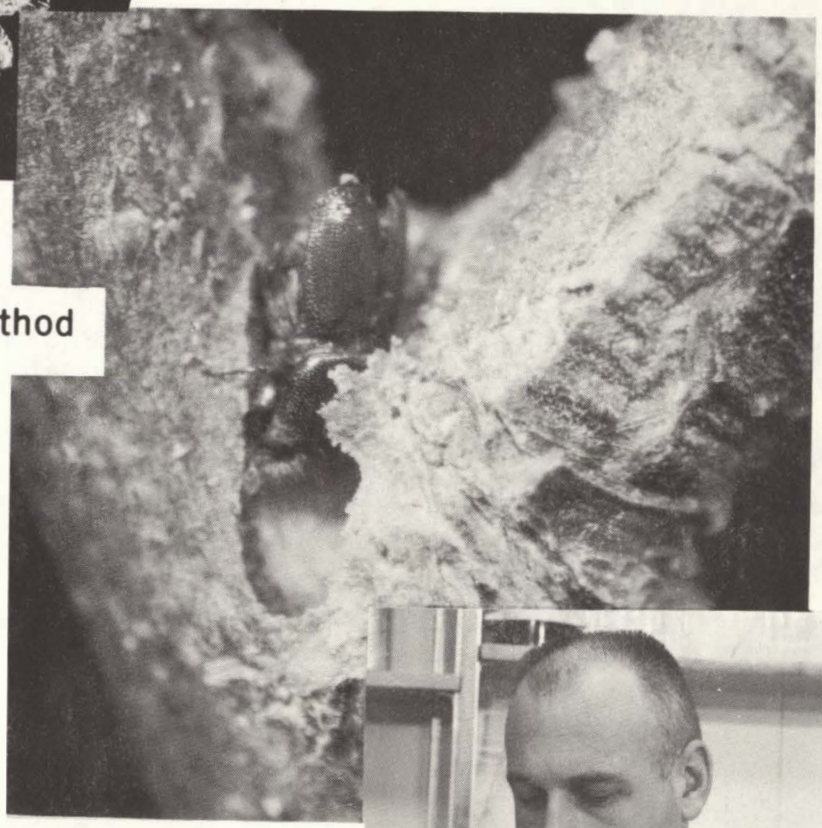
Doskotch, R. W., S. K. Chatlerji, and J. W. Peacock. 1970. Elm-bark derived feeding stimulants for the smaller European elm bark beetle. Science 167:380-382

the carrier



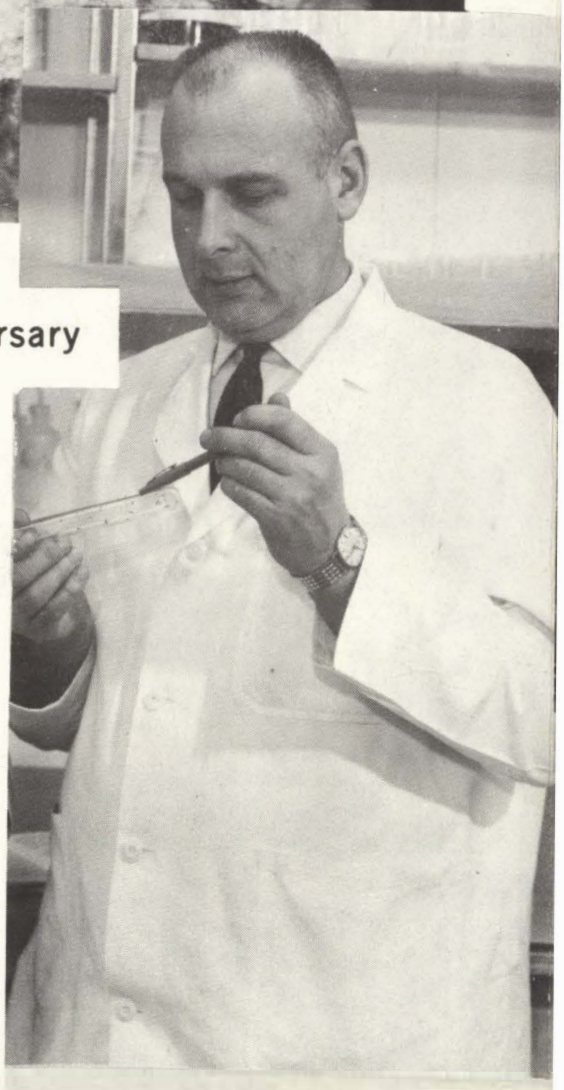
In size, it's no larger than a pencil point. But in power, it's the Number 1 enemy of American Elms. It's the European elm bark beetle, carrier of Dutch Elm disease.

its method



The minute insect feeds on the bark in the crotches of young elm branches, and if carrying the Dutch Elm disease fungus, may in this manner introduce it into healthy elm trees.

its adversary



Dr. Charles A. Lincoln, Entomologist, heads the Forest Service research team at Delaware, Ohio. The scientists are searching for ways to control Dutch Elm Disease.